



## Filicide and fatal abuse in Japan, 1994–2005: Temporal trends and regional distribution<sup>☆</sup>

Katsuhiro Yasumi MD (Associate Professor)<sup>a,\*</sup>, Jinsuke Kageyama MD PhD (Professor)<sup>a,b</sup>

<sup>a</sup> Health Service Center, Tokyo Institute of Technology, 4259 Nagatsuta-cho, Midori-ku, Yokohama 226-8503, Japan

<sup>b</sup> Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8550, Japan

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### ABSTRACT

To describe the recent filicide features in Japan, data were collected from newspaper databases between 1994 and 2005 and compared with several official statistics. From this dataset, 933 cases and 1084 victims under age 15 were identified. Fatal abuse cases were most prevalent (309 cases, or 33.1%), followed by filicide-suicide cases (303, or 32.5%) and unwanted child cases (225, or 24.1%). Infants under the age of one were most at risk (filicide rate: 2.72 per 100,000 for the same aged infants). Annual filicide numbers showed an upward trend between 1994 and 2001 and the average filicide rate per year was 0.42 per 100,000 for children under age 15. Both the number of cases over the period and the filicide rate per year by prefecture ranged widely. Furthermore, the annual filicide rates over the period were strongly correlated with both suicide rates and unemployment rates for the general population ( $r = .884$  and  $.926$ , respectively;  $p < .001$  for both). The measure of filicide per region and the predominating category in a prefecture provides direction for filicide prevention. Result suggests that recent socioeconomic situations have a significant effect on not only filicide-suicide but also the overall filicide rate in Japan.

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### 1. Introduction

Filicide is a term describing the murder of children by their parents. Although it is a relatively rare form of homicide, filicide is a specific and non-negligible cause of childhood deaths which has been recognized widely across cultures throughout history. Long ago some children were killed because of superstitious or religious beliefs. Some were victims of population control, referred to as a “thinning out” in Japan. For economic reasons, a son-preference in certain societies can be the cause of filicide even today.<sup>1,2</sup> Femicide cases are likely to be reported in an exaggerated fashion, raising public concern. A classification system has been proposed by many researchers due to the diversity of these cases.

Resnick<sup>3</sup> made the first and most notable classification attempt by creating a system based on apparent motive. He distinguished neonaticide (the killing of a child on the first day of life) from filicide<sup>4</sup> and also divided filicide into five categories: altruistic, accidental, acutely psychotic, unwanted child, and spouse revenge. In the 1970s, Scott<sup>5</sup> focused on the source of the impulse to kill, and d'Orban<sup>6</sup> modified Scott's classification to include battering

mothers, mentally ill mothers, neonaticides, retaliating women, unwanted children, and mercy killing.

In the 1990s, Bourget and Bradford<sup>7</sup> have provided five major categories (pathological filicide, accidental filicide, retaliating filicide, neonaticide, and paternal filicide) and stressed the importance of paternal filicide. In recent years, Wilczynski<sup>8</sup> has proposed a classification of filicide consisting of 11 motive categories, and this may be the most comprehensive of all existing motive-based typologies.

Unlike these motive-based classification systems, Meyer and Oberman<sup>9</sup> have proposed a distinct typology of maternal filicide. They described “the patterns associated with filicides from an interactional perspective, encompassing a wide array of social, cultural, environmental, and individual variables.” Categories in their classification system are: filicide related to an ignored pregnancy, abuse-related filicide, filicide due to neglect, assisted/coerced filicide, and purposeful filicide.

Along with filicide categorization, many studies have focused on filicide-associated mental disorders. The rate of mental disorders among filicidal parents varies widely,<sup>3,6,7,10–16</sup> partly due to differences in study design (population type, gender of perpetrators). Many have shown that depression (major depression and postpartum depression in maternal filicide) and acute psychosis (predominantly schizophrenia) are common among mentally ill filicidal parents. Some researchers suggest that some filicidal parents might have personality disorders.<sup>6,7,9</sup> Munchausen syndrome by

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\* Corresponding author. Tel.: +81 45 924 5107; fax: +81 45 924 5108.

E-mail address: [yasumi@sok.titech.ac.jp](mailto:yasumi@sok.titech.ac.jp) (K. Yasumi).

proxy is rare (or difficult to detect) and often results in fatal abuse.<sup>17</sup>

In the early 1970s, the media in Japan extensively reported cases of neonaticide and neonatal abandonment, raising public concern. Several important studies were conducted around the same time.<sup>18–22</sup> A typological study by Fukushima provided five categories of filicide that were based on the combination of the offender's and victim's age. The categories identified were neonaticide, mental disorder, disabled children, abuse, and others (i.e. unclassifiable). The study further subdivided mental disorder type into three categories, referred to as endogenous psychosis (schizophrenia, bipolar disorder, and atypical psychosis), postpartum psychosis (postpartum depression and neurosis of child-raising), and reactive depression.<sup>19</sup> As a whole, most studies in Japan have been designed around cases in which forensic psychiatric evaluation was conducted,<sup>19–21</sup> or when judicial records were available.<sup>23,24</sup>

Existing studies are grouped by the population type of the subject,<sup>2</sup> as well as by category of child murder (i.e. neonaticide, maternal filicide, paternal filicide, filicide–suicide). Studies of correctional or psychiatric populations, especially those of incarcerated offenders or psychiatrically hospitalized patients, are better suited for detailed evaluation. Studies based on judicial or administrative records (e.g. coroner's records and home office records) allow the demographic and statistical analysis of various filicides, including filicide–suicide cases. Although information about each case is limited, it is possible to work with a large sample size in studies that are based on news databases or official statistics (such as police and mortality statistics). However, when attempting to estimate the true incidence, we should consider the 'dark figure' of filicides – that is, that many cases are not detected or labelled as such. Wilczynski has suggested five factors for this: cases in which maltreatment is not the immediate cause of death, cot death, the legal difficulties of proof, cases where no body is found or identified, and professional reluctance to act.<sup>25</sup>

Filicide studies, especially those using an epidemiological approach, may help reduce the risk of filicide. Although several studies have reported on a nationwide sample over a certain period,<sup>11,12,26–34</sup> there are few studies that have conducted a regional comparison in parallel.<sup>35</sup>

### 1.1. Objective of the present study

In the present study, we collected reports of filicide cases from newspaper databases to describe the recent features of filicide in Japan. We examined characteristics of filicide not only of the whole country but also by prefecture. Furthermore, obtained results were also compared with several official statistics to verify associations with social factors. The goal of this study is to clarify the general characteristics of filicide in Japan, which in turn will provide a basis on which to take measures to prevent filicide by region.

## 2. Methods

In the present study, we defined filicide as the killing of children under the age of 15 years by their parents (including stepparents). Filicide cases during the period of 1994–2005 were identified retrospectively by searching databases that provide full text articles from one of Japan's leading national newspapers (Asahi Shimbun), including all regional editions.

According to the contents of news reports, cases were classified into the following seven categories: fatal abuse, filicide–suicide, unwanted child, mental illness, altruistic, retaliatory, and others/unspecified.

The fatal abuse category included neglect cases that lead to a child's death, as well as the killing by one or a series of assaults. Fili-icide–suicide cases were based on news articles in which fili-

cides were associated with the offender's suicidal act. The unwanted child category included neonaticide cases as well as some cases of neonatal abandonment (except cases involving abuse-related behavior). The mental illness category was confined to cases in which mental disease in the offender was stated in the news report. Cases in the altruistic category in this study were defined as filicides with intention to relieve the child's suffering, not including cases accompanied with parent's suicidal act (such cases were classified into filicide–suicide category). The definition of the retaliatory category conformed to that of spouse revenge by Resnick.<sup>3</sup>

Unlike many earlier studies, filicide–suicide was listed as an independent category in our classification system. This was partly because filicide–suicide (as a type of murder-suicide, "shinju" in Japanese) is not uncommon in Japanese society<sup>36</sup> and also because adopting this system enabled comparison with the data of Inamura's study,<sup>18</sup> which was conducted using similar methods.

Demographic data for all cases were examined using descriptive statistics. Filicide rates were calculated based on the number of filicide cases per year and the population of the relevant age groups during the reference year. The population data by age group and prefecture were based on the Vital Statistics of Japan from 1994 to 2005.

The number of infanticide victims (infanticide is defined as filicide of a child under the age of one) was compared with data from the vital statistics and police statistics (the National Police Agency statistics), such as annual numbers of homicide victims under the age of one. Filicide rates were also compared with suicide rates, homicide rates, and unemployment rates in the general population. All statistical analyses were performed using SPSS 16.0 for Macintosh.

## 3. Results

### 3.1. Data set

For the 12-year period of 1994–2005, 933 filicide cases were identified from the database. In 151 of the 933 cases, more than one child was killed, making the total number of victims 1087, of which three were 15 or older.

The annual case numbers showed an upward trend over the period of 1994–2001 (from a low of 53 in 1994 to a high of 104 in 2001) and had a downward trend with a little fluctuation since 2001 (Fig. 1).

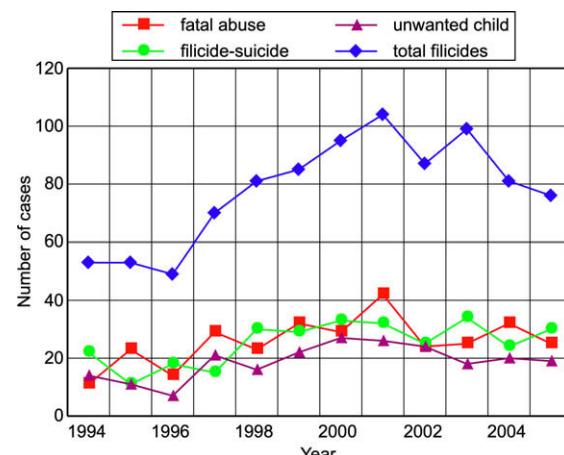


Fig. 1. Filicides: temporal trends by three leading categories, 1994–2005.

### 3.2. Victim characteristics

Among the 1084 victims under the age of 15, 379 (35.0%) were under one year old, 361 (33.3%) were between ages one and four, 228 (21.0%) were ages five to nine, and 116 (10.7%) were ages 10–14.

Of the victims whose gender was identifiable, 552 (53.0%) were boys, and 490 (47.0%) were girls. The difference in gender-specific mortality was not statistically significant for overall filicides ( $X^2$  (df = 1) = 1.258;  $p$  = .262). By age group, boys accounted for 50.2% of the victims under age one, 56.7% of those aged one to four, 50.0% of those aged five to nine, and 56.5% of those aged 10–14. In the age group of one to four, boys were statistically more likely to be victimized ( $X^2$  (df = 1) = 4.248;  $p$  = .039). Of 552 male victims, 297 (53.8%) were killed by their mother, 138 (25.0%) by their father and 82 (14.9%) by both parents (perpetrators of 35 victims were indeterminate). Of 490 female victims, 289 (59.0%) were killed by their mother, 102 (20.8%) by their father, and 61 (12.4%) by both parents (perpetrators of 38 victims were indeterminate).

### 3.3. Offender characteristics

The perpetrator was the mother in 511 (54.8%) cases, the father in 209 (22.4%) cases, and both parents in 118 (12.6%) cases. In 95 (10.2%) cases, perpetrators were indeterminate, and all these victims were under the age of one. Excluding indeterminate-perpetrator cases, mothers (alone or as co-offenders) were responsible for 84.8% of filicides where the victim was under the age of one.

In father-perpetrated cases (including co-offender cases), 56.2% of the victims were boys, whereas boys and girls were equally likely to be the victims in mother-perpetrated cases.

Stepfathers accounted for 27.8% of father-perpetrators, whereas stepmothers accounted for only 1.2% of mother-perpetrators. Father-perpetrators were significantly older than mother-perpetrators ( $n$  = 328, mean age  $\pm$  SD = 33.7  $\pm$  10.1 vs.  $n$  = 597, mean age  $\pm$  SD = 31.3  $\pm$  7.5, respectively;  $T$  = 5.907;  $p$  < .001). Altogether, 40.5% of fathers and 31.2% of mothers were age 35 or older.

Information about the employment status of perpetrators was available only in a limited proportion of the cases. Of 302 mother-perpetrators for whom employment information was known, 165 (54.6%) were housewives, 72 (23.8%) had a job, and 65 (21.5%) were unemployed. Of 272 father-perpetrators, 180 (66.2%) had a job and 92 (33.8%) were unemployed.

In many cases of maternal filicide without an accomplice, the news report did not give the details about the marital status of the mother. Therefore, little was known about marital status of the entire perpetrator population.

### 3.4. Categorical characteristics

Of the 933 cases, 309 (33.1%) were classified as fatal abuse, 303 (32.5%) were filicide-suicide, and 225 (24.1%) were an unwanted child. These three categories accounted for approximately 90% of the total number of cases. Among the remainder, 43 (4.6%) were mental illness, 17 (1.8%) were altruistic and 12 (1.3%) were retaliatory. Fig. 1 shows the temporal trends of the number of cases for the three leading categories.

Among victims under the age of one, unwanted child filicide cases were most prevalent (60.5%), followed by fatal abuse (23.2%) and filicide-suicide (8.7%). In those victims aged one to four, fatal abuse was the leading category (58.1%), followed by filicide-suicide (31.2%) and mental illness (2.8%). In contrast, filicide-suicide cases dominated in both the five to nine and ten to fourteen age groups (61.2% and 67.3%, respectively).

Comparing the age of perpetrators between fatal abuse and filicide-suicide cases, mothers of filicide-suicide case were signifi-

cantly older than those of fatal abuse ( $n$  = 226, mean  $\pm$  SD = 34.4  $\pm$  6.6 vs.  $n$  = 187, mean  $\pm$  SD = 28.7  $\pm$  6.0, respectively;  $T$  = 8.990;  $p$  < .001). The same was especially true in fathers ( $n$  = 112, mean  $\pm$  SD = 40.9  $\pm$  9.3 vs.  $n$  = 185, mean  $\pm$  SD = 29.2  $\pm$  6.9, respectively;  $T$  = 12.330;  $p$  < .001). The average age in mothers of unwanted child cases was not significantly different from that of fatal abuse ( $n$  = 108, mean  $\pm$  SD = 27.8  $\pm$  8.6 vs.  $n$  = 187, mean  $\pm$  SD = 28.7  $\pm$  6.0, respectively;  $T$  = 1.133;  $p$  = .258).

In 309 cases of fatal abuse, mothers and fathers were equally responsible for filicide (40.3% were mothers, 39.6% were fathers, and 20.1% of the cases involved both parents). Boys were more likely to be victimized in the one to four years of age group (90 of 168, 53.6%), whereas there were slightly more girls than boys in the age group under one (43 of 81, 53.1%).

The most common fatal methods were beating (48%), followed in order by neglect (11%), strangulation (9%), suffocation (8%), throwing (7%), drowning (7%), burning (2%), and stabbing (1%). No cases of firearm usage were found.

### 3.5. Multiple filicide cases

Of 151 multiple filicide cases (i.e. killing more than one child), 137 cases involved two victims, 12 cases involved three victims, and two cases involved four victims. Children were killed by the father in 34 (22.5%) cases, the mother in 93 (61.6%) cases, and both parents in 24 (15.9%) cases. Stepfathers accounted for 5.2% of father-perpetrators, while 27.8% of the aggregate paternal filicide cases. Based on motive, filicide-suicide cases were by far the most prevalent (123 of 151, 81.5%).

### 3.6. Filicide rates and regional distribution

During the period 1994–2005, the average annual filicide rate was 0.42 per 100,000 for children under the age of 15. Annual rates ranged from a low of 0.26 per 100,000 in 1994 to a high of 0.57 per 100,000 in 2001. By age group, the rate was 2.72 per 100,000 for infants under age one, 0.64 for victims ages one to four, 0.31 for those ages five to nine, and 0.14 for ages 10–14.

According to the number of filicide cases over the period by prefecture, Osaka had the most by far with 91 cases, followed by 64 in both Tokyo and Aichi. Tokyo, Osaka, and Aichi are the most populated prefectures in Japan, with approximately 12 million, 8.8 million, and 7 million people during the 1994–2005 period, respectively. Osaka also had the highest number of fatal abuse cases over this period (43 cases), followed by 29 in Saitama (with the fifth-ranked population of 6.9 million people). In contrast, the total number of filicide cases over the period was five or less in seven prefectures located in rural areas, of which four, Tokushima (820,000), Kochi (810,000), Shimane (760,000), and Tottori (610,000), were the least populated prefectures. The numbers of cases by prefecture are shown in Table 1.

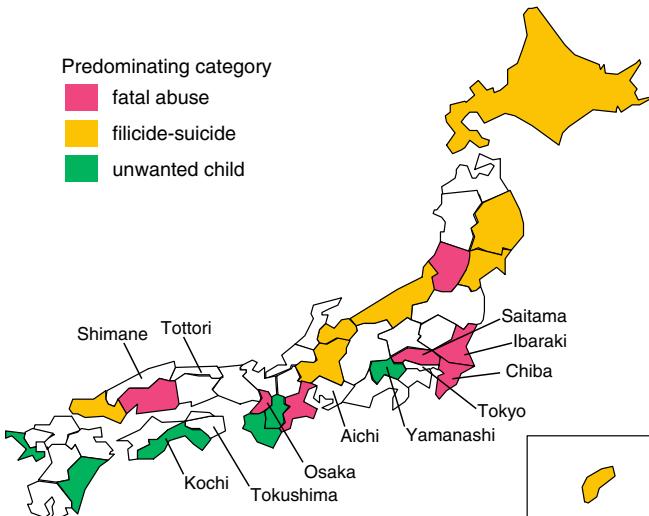
The average annual filicide rates by prefecture also ranged widely from a low of 0.14 per 100,000 in Tokushima to a high of 1.03 per 100,000 in Yamanashi (mean = 0.42, SD = 0.18 per 100,000 for children under age 15). In Yamanashi, unwanted child cases were the most frequent and accounted for more than half of all cases (9/17). The filicide rates by prefecture are also shown in Table 1.

Prefectures were grouped according to the predominating category of filicide. In seven (14.9%) of the 47 prefectures, fatal abuse dominated with over 40% of all cases and more than 1.5 times the number of cases of any other category. Similarly, filicide-suicide dominated in eight (17.0%) prefectures, and unwanted child filicide was greatest in six (12.8%) prefectures. These distributions are shown in Table 1 and Fig. 2.

**Table 1**

Number and rate of cases by prefecture from 1994 to 2005

Prefecture	Number of cases	Rate <sup>a</sup>	Prefecture	Number of cases	Rate <sup>a</sup>
Hokkaido	42 <sup>c</sup>	0.43	Shiga	11	0.41
Aomori	7	0.26	Kyoto	7	0.16
Iwate	9 <sup>c</sup>	0.35	Osaka	91 <sup>b</sup>	0.59
Miyagi	20 <sup>c</sup>	0.46	Hyogo	30	0.30
Akita	14	0.70	Nara	6 <sup>d</sup>	0.23
Yamagata	7 <sup>b</sup>	0.31	Wakayama	6 <sup>d</sup>	0.31
Fukushima	16	0.39	Tottori	5	0.44
Ibaraki	29 <sup>b</sup>	0.52	Shimane	5	0.37
Tochigi	22	0.59	Okayama	16	0.45
Gunma	29	0.78	Hiroshima	9 <sup>b</sup>	0.17
Saitama	56 <sup>b</sup>	0.45	Yamaguchi	14 <sup>c</sup>	0.54
Chiba	41 <sup>b</sup>	0.40	Tokushima	2	0.14
Tokyo	64	0.36	Kagawa	13	0.72
Kanagawa	60	0.41	Ehime	11	0.42
Niigata	15 <sup>c</sup>	0.34	Kochi	5 <sup>d</sup>	0.37
Toyama	6 <sup>c</sup>	0.31	Fukuoka	33	0.36
Ishikawa	5	0.23	Saga	7	0.40
Fukui	7	0.45	Nagasaki	12 <sup>d</sup>	0.41
Yamanashi	17 <sup>d</sup>	1.03	Kumamoto	5	0.14
Nagano	11	0.27	Oita	18	0.82
Gifu	9 <sup>c</sup>	0.23	Miyazaki	6 <sup>d</sup>	0.26
Shizuoka	39	0.57	Kagoshima	15	0.44
Aichi	64	0.49	Okinawa	5 <sup>c</sup>	0.16
Mie	11 <sup>b</sup>	0.32			

<sup>a</sup> Average annual rate over the period per 100,000 children under age 15.<sup>b</sup> Fatal abuse predominates.<sup>c</sup> Filicide–suicide predominates.<sup>d</sup> Unwanted child predominates.**Fig. 2.** Prevalence of filicide categories by prefecture: in seven prefectures indicated in red, fatal abuse dominated with over 40% of all cases and more than 1.5 times the number of cases of any other category. Similarly, filicide–suicide dominated in eight prefectures indicated in yellow, and unwanted child filicide dominated in six prefectures indicated in green.

### 3.7. Comparison with official statistics

Table 2 represents the number of infanticide deaths in this study compared with two Japanese official statistics (vital statistics and police statistics). Although the official statistics data regarded general child homicide (i.e. not just filicide), the annual number of filicide deaths in the present study has surpassed those of general child homicide deaths in two official statistics since 1999.

The annual filicide rates for the 12-year period were strongly correlated with suicide rates for the general population in Japan ( $r = .884$ ;  $p < .001$ ), and were uncorrelated with homicide rates ( $r = .071$ ;  $p = .836$ ; suicide rates and homicide rates were calculated using data from the Vital Statistics). Additionally, the annual fili-

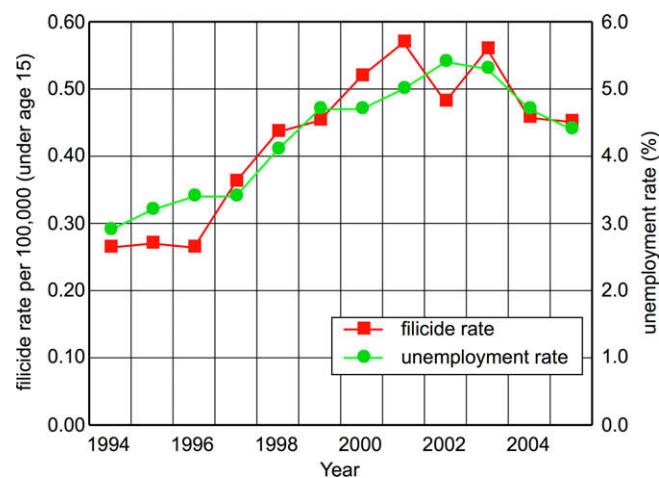
**Table 2**

Number of deaths by filicide and child homicide under age one

Year	Present study	Police statistics	Vital statistics
1994	20	45	41
1995	18	52	32
1996	15	52	36
1997	32	41	31
1998	25	38	39
1999	35	26	30
2000	39	33	29
2001	48	40	27
2002	39	29	30
2003	43	27	35
2004	31	24	26
2005	34	27	21

Present study: number of filicide (infanticide) victims.

Police statistics and vital statistics: number of child homicide victims (perpetrators are not confined to the parents).

**Fig. 3.** Filicide rate and unemployment rate, 1994–2005.

cide rates were also strongly correlated with unemployment rates ( $r = .926$ ;  $p < .001$ ; see Fig. 3). The correlation between homicide rates and unemployment rates was not significant ( $r = -.005$ ;  $p = .988$ ).

### 4. Discussion

The average annual filicide rate of 0.42 per 100,000 children under the age of 15 for the period of 1994–2005 used in this study is not significantly different from the rate of 0.43 per 100,000 for the period of 1973–1975 in Japan, calculated based on results from Inamura's study<sup>18</sup> and population data from the same period. Inamura extracted 349 filicide cases using a method similar to ours, and findings from that study consisted of 47.9% filicide–suicide cases and 9.3% fatal abuse cases. In contrast, fatal abuse cases were most prevalent (33.1%) in the present study, and were slightly more prevalent than filicide–suicide (32.5%) cases. This suggests that fatal abuse problems are more serious than they were in the 1970s.

Child abuse has emerged as a serious social problem since the 1990s in Japan. The number of counseling cases related to child abuse in child consultation offices has increased by more than 30 times from 1101 in fiscal year 1990 to 34,472 in fiscal year 2005.<sup>37</sup> This rapid growth is assumed to be the result of an increase both in the actual number of cases and in the number of reported cases that used to be ignored. The latter increase seems to be largely due to enforcement and revision of the child abuse prevention

law during this period, as well as growing social concerns regarding child abuse. Compared to child abuse in general, fatal abuse cases could be identified more precisely. The average annual number of fatal abuse cases over the second half of the period increased by 34.1% compared to the first half. Criminological research has suggested the possibility of a fairly stable ratio of aggravated assaults to homicides.<sup>38</sup> If this is applied to the ratio between child abuse and fatal abuse cases, child abuse cases in general may actually have increased at the same level of fatal abuse cases. At the same time, it should be noted that some filicides might have been handled as deaths resulting from accidents and other causes, such as sudden infant death syndrome (SIDS).<sup>25,39–43</sup>

The average annual rate of infanticide was 2.72 per 100,000 children under the age of one, which was much higher than any other age group. This finding coincides with earlier studies that suggested that younger infants are at higher risk for filicide or homicide.<sup>27,30,34,35,41,44,45</sup> Several authors have noted that boys are more likely to be victimized.<sup>11,31,44,46–49</sup> In our results, although the number of male victims was overrepresented to female victims in all age groups, no statistical difference was found for overall filicides.

Unwanted child filicide accounted for 60.5% of infanticide, including neonaticide. There were only nine cases that strictly met the definition of neonaticide (killing within the first 24 h of life) due to difficulty in confirming the exact time of death using information from a news article. It is estimated that cases of abandonment of a corpse include more than a few cases of neonaticide in reality. The prefectures where unwanted child filicide predominates are located in rural areas. This may indicate that abortion is less socially acceptable in rural areas<sup>46</sup> or that it is more difficult for single mothers to raise their children and earn a living in those areas. Most authors have noted that neonaticidal mothers are often younger than other filicidal mothers.<sup>4,39,41,44,46,50</sup> In contrast, however, the average age of the nine neonaticidal mothers in the present study was 29.8 (SD = 10.3), which was not low compared to either fatal abuse mothers or overall unwanted child mothers.

Father-perpetrators are older than the mothers in both fatal abuse and filicide–suicide cases. Furthermore, filicide–suicide parents were older than fatal abuse parents. Especially in filicide–suicide cases, the average age of the father-perpetrators were over 40. This may be related to the rapid increase in suicides among the middle-aged male population in Japan, as stated later.

In our study, multiple filicides accounted for 16.2% of all filicides, and most of them (81.5%) were filicide–suicides.<sup>51</sup> Some multiple filicides could be also familicide (defined as killing the offender's spouse and one or more children). Familicide is said to be strongly associated with the offender's suicide.<sup>29</sup> Intra-familial multiple homicide results in an enormous tragedy. Therefore, prevention of the parent's suicide becomes much more important.

From the results of the prefecture analysis, the incidence and predominating type of filicide varies widely. Most prefectures where filicide–suicide predominates are located in rural areas. The same is true in prefectures that feature dominant unwanted child filicide. In contrast, of the seven prefectures where fatal abuse is dominant, one is Osaka (with the second largest population in Japan), and three (Saitama, Chiba and Ibaraki) are located in the suburbs of Tokyo and have comparatively large populations. Although there are few studies showing cross-regional comparisons of filicide all over the country among the earlier studies,<sup>35</sup> the findings of which filicide category predominates in each prefecture could provide prefecture-based directions for preventative measures. This suggests that child abuse prevention should be given high priority in prefectures where fatal abuse is predominant. Similarly, suicide-prevention should be taken as a high priority in cases of filicide–suicide and maternal health care would be the most important in cases of unwanted child. In addition to this, psychiatrists, pediatricians, and the health care staff involved

should inquire about the prevalence of parental filicidal thoughts, not just suicidal thoughts.<sup>52</sup>

Annual filicide rates in this study show strong correlations with suicide rates in the general population, and do not correlate with homicide rates. This finding is consistent with the findings of earlier studies that suggested that child homicide rate under the age of four was inconsistent with homicide rate in the general population<sup>53</sup> and maternal filicide rate correlated with suicide rates in the general population.<sup>54,55</sup> Furthermore, annual filicide rates correlate strongly with unemployment rates. In Japan, a rapid increase in middle-aged male suicides has boosted the overall suicide rate since 1998. This phenomenon is said to be associated with the recession following the collapse of the asset-inflated economy. Several authors have pointed out the correlation between suicide rate and economy fluctuations.<sup>56–60</sup> Several studies have suggested a trend of regional suicide rate differences, consistent with those of unemployment rates or other socioeconomic index in Japan.<sup>61–63</sup>

Archer and Gartner have reported that the correlation between homicide rates and unemployment rates varies from nation to nation.<sup>64</sup> According to their cross-national study, homicide rates were positively correlated with unemployment rates mainly before 1970 in Japan. However, we found no significant correlation between them over the period of 1994–2005. Although few reports are available on the direct comparison between filicide rates and unemployment rates, our strong correlation between them suggests that filicide is more susceptible to socioeconomic factors than homicide in general. In fact, one-third of father-perpetrators in the present study were without occupation. This proportion is much higher than the unemployment rate in the general population.<sup>12</sup> Further studies are needed to validate the consistency between filicide rate and socioeconomic factors over long periods.

As shown in Table 2, the annual number of victims under the age of one year in our study has surpassed that of homicide victims of the same age in two official statistics since 1999. Aside from the problem of the 'dark figure',<sup>25</sup> the question of whether the media has covered all identified case is one of the limitations of this study. However, the number of fatal abuse cases found in our search corresponds with the figure in the 2004 police statistics, when child abuse had already been recognized as a major social problem. Although apparent homicide cases would be covered without omission by newspapers including all regional editions, a small portion of filicide cases before then may not have been reported. It is difficult to examine the concordance throughout the period because of a shortage of filicide-related data in official statistics. Conversely, searching news databases could be a useful method when the problem of child abuse and homicide draws public attention.

Another limitation is the possibility of underestimating the prevalence of mentally ill perpetrators. In an initial incident report in the newspapers, information about the perpetrator's psychiatric disorder is generally insufficient. Although we classified cases according to information in articles and follow-up reports, few cases were followed up for additional details. As a result, the percentage of mental illness case is 4.6% in the present study, which is much lower than in earlier studies. In reality, considerable filicide–suicide cases may have occurred due to depression or other acute psychosis. It is also possible that some of the fatal abuse perpetrators were diagnosed with a personality disorder or Munchausen syndrome by proxy.

## 5. Conclusion

This study provides several insights on recent filicide in Japan. Filicides are unevenly distributed, both by age group and region. In addition, the difference between types of filicide should be taken

into account. Based on these findings, further studies are required for considering regional preventive measures. Our results also suggest the importance of the socioeconomic backgrounds of the parents. Many population studies have been conducted regarding suicide or homicide associated with socioeconomic factors. In addition to those, filicide should be studied in a similar fashion.

## Conflict of interest statement

None declared.

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